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EXAMINER	
TSOY, ELENA	
ART UNIT	**PAPER NUMBER**
1762	

DATE MAILED: 12/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/914,204	MACNEIL ET AL.	
	Examiner	Art Unit	
	Elena Tsoy	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *1,2,3,4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Claim Objections

1. Claim 12 is objected to because of the following informalities: "the layer is supported as a platen" seems to be incorrect. Appropriate correction is required. For examining purposes the phrase was interpreted according to specification (See page 3) as "the layer is supported on a platen".

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1, 12, 14, 17, 18 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 3, 7, 8, 20, 31 of U.S. Patent No. 6,544,858. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of '858 recites a method of depositing a silicon containing-polymer on a semiconductor wafer (Claim 20 of '858) from silicon containing compound such as higher silane (Claim 2 of '858) and hydrogen peroxide (Claim 3 of '858) *thus forming a polymer layer including Si-C bonds of claim 1 of claimed invention,* and heating the polymer layer by a heated platen (Claim 7 of '858) to a temperature of 300^0C -500^0C (Claim 8 of '858) thereby

densifying (hardening) (Claim 31 of '858) the layer (and *desorbing moisture*), and treating with plasma the heated layer.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1-3, 14, 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsukune et al (US 5,314,724).

Tsukune et al disclose a method of processing a polymer layer including Si-C bonds (See column 7, lines 37-55) deposited on a substrate such as silicon (semiconductive) wafer (See column 11, line 64) including the steps of heating the polymer layer to temperature of 450^0C - 850^0C to desorb moisture and partially crosslink (See column 10, lines 1-14, 49-57; column 11, lines 5-22), and exposing the layer to a plasma such as H_2 plasma for 5-60 seconds at the same temperature (during the heating process) (See column 12, lines 16-43).

It is the Examiner's position that the processed polymer layer has claimed properties, e.g. the dielectric constant of less than 3.00, reduced cracking and improved wet etch rate, *inherently* since it is prepared and processed by methods substantially identical to that of claimed invention (See specification, page 6, lines 3-15).

It is held that where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, claimed properties or functions are presumed to be inherent. See MPEP 2111.02, 2112.01. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

6. Claims 1-3, 12, 14, 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Beekman et al (WO 98/08249).

Beekman et al disclose a method of processing a polymer layer including Si-C bonds (See page 3) deposited on a substrate supported on a platen which is maintained at a temperature of 100^0C-450^0C (See page 5, lines 17-20). The polymer layer may be heated to 350^0C-470^0C using plasma heating for 10 to 60 minutes to desorb moisture and crosslink the polymer layer (See page 5, lines 21-28).

It is the Examiner's position that the processed polymer layer has claimed properties such as the dielectric constant of less than 3.00, reduced cracking and improved wet etch rate *inherently* since it is prepared and processed by methods substantially identical to that of claimed invention (See specification, page 6, lines 3-15).

7. Claims 1-3, 14, 18, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Makita et al (US 5,619,044).

Makita et al disclose a method of processing a silicon oxide polymer layer 221 deposited on a substrate such as crystalline silicon film (See column 13, lines 5-9) by CVD from TEOS (tetraethylorthosilicate) (See column 12, lines 61-67), including the steps of annealing the polymer layer at temperature of 350^0C for 30 minutes under hydrogen plasma atmosphere (See column 17, lines 1-11).

It is the Examiner's position that a polymer layer includes Si-C bonds *inherently* since it is deposited by CVD from tetraethoxy silane; heating desorbs moisture and hardens the polymer layer under *inherently*, and the processed polymer layer has claimed properties such as the dielectric constant of less than 3.00, reduced cracking and improved wet etch rate *inherently* since it is prepared and processed by methods substantially identical to that of claimed invention (See specification, page 6, lines 3-15).

8. Claims 1, 3-12, 14, 17-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Li (US 6,383951).

Li discloses a method of processing a polymer layer including Si-C bonds (See column 4, lines 23-24) deposited on a substrate such as silicon (semiconductive) wafer (See column 1, line 14; column 7, lines 28-29) by CVD from tetraethylorthosilicate (TEOS) (See column 6, lines 14-23), or methyl silane and hydrogen peroxide (See column 4, lines 28-41), including the steps of heating the polymer layer to temperature of 400^0C -800^0C (See column 5, lines 46-50) to desorb moisture (See column 6, lines 3-5), and exposing the layer to a plasma such as N_2O/N_2 or oxygen plasma for 5-90 seconds (See column 5, lines 11-16) during the heating process (See column 5,

lines 57-61). The dielectric constant of the processed polymer layer is below 3.00 (See column 6, lines 8-10). The substrate on which the polymer layer is formed may be supported on a pedestal (platen) including heating resistive heating elements (See column 5, lines 60-63). RF power of between about 0.1 kW and 1 kW, more preferably about 0.5 kW sufficient to disassociate the N_2O/N_2 gas was applied to the electrodes of a plasma reactor (See column 5, lines 20-26). However, the ionizing power can be coupled to the gas by way of microwave plasma or inductively coupled plasma as well (See column 5, lines 28-29). The gate electrode may directly contact the insulating polymer layer 40 (See column 10, lines 30-40), i.e. the insulating polymer layer 40 may be supported on the electrode.

It is the Examiner's position that a polymer layer having Si-C bonds deposited by CVD from methyl silane and hydrogen peroxide hardens under heating *inherently*, and the processed polymer layer has claimed properties such as and improved wet etch rate *inherently* since it is prepared and processed by methods substantially identical to that of claimed invention (See specification, page 6, lines 3-15).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 2, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US 6,383951) in view of Makita et al (US 5,619,044).

Li fails to teach that the plasma is hydrogen plasma.

Makita et al, as applied above, further teach that hydrogen supplied by plasma terminates dangling bonds in a crystalline silicon film with hydrogen at interface thereby improving characteristics of semiconductive device (See column 13, lines 5-9; column 17, lines 9-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used hydrogen plasma instead of N_2O/N_2 or oxygen plasma in Li while heating with the expectation of providing the desired termination of dangling bonds in a crystalline silicon film with hydrogen at interface since Makita et al teach that hydrogen supplied by plasma terminates dangling bonds in a crystalline silicon film with hydrogen at interface thereby improving characteristics of semiconductive device.

11. Claims 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US 6,383951).

Li fails to teach that the polymeric layer is treated by the plasma to a depth of greater than 3000 Angstrom (Claim 15) or less than 600 Angstrom (Claim 16).

One of ordinary skill in the art at would understand that the depth of plasma treating of the CVD deposited polymeric layer would depend on thickness of the layer or temperature of the treatment, on desired dielectric constant, etc. In other words, the depth of plasma treating limitations is a result-effective parameter in process of making low constant dielectric layers.

It is held that it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant depth parameters (including those of claims 15, 16) in Li through routine experimentation in the absence of a showing of criticality.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is (703) 605-1171. The examiner can normally be reached on Mo-Thur. 9:00-7:30, Mo-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for all communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

ETsoy

Elena Tsoy
Examiner
Art Unit 1762

December 4, 2003